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Atsuo Omaru

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SONNENSCHN NATH & ROSENTHAL LLP
P.O. BOX 061080
WACKER DRIVE STATION, SEARS TOWER
CHICAGO, IL 60606-1080

EXAMINER

DOVE, TRACY MAE

ART UNIT

PAPER NUMBER

1745

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

09/810,962

Applicant(s)

OMARU ET AL.

Examiner

Tracy Dove

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-5 and 15-46 is/are pending in the application.
- 4a) Of the above claim(s) 15-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the communication filed on 12/31/06. Applicant's arguments have been considered, but are not persuasive. Claims 1, 3-5 and 15-46 are pending with claims 15-46 being withdrawn. This Action is FINAL, as necessitated by amendment.

Claims Analysis

The claimed invention recites the graphite in the negative electrode has a "rhombohedral structure". The specification discloses that natural graphite has a "rhombohedral structure" (page 21) and that natural graphite having a "rhombohedral structure" may be used as a starting material (page 42). Thus, in view of the teaching of the present specification, natural graphite contains a "rhombohedral structure".

The claimed invention recites "the proportion of weight reduction due to the component other than graphite and as measured by DTG, is at least 5% and at most 40%", which is not given patentable weight because the limitation is a product-by-process limitation. Product-by-process limitations, in the absence of unexpected results, are not given patentable weight. The component other than graphite does not appear to be present in the produced negative electrode graphite material.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 3-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Claims 1 and 3-5 recite the graphite material comprises graphite and a component or material other than graphite, which is indefinite. A graphite material is by definition graphite. It is unclear how a graphite material includes a material that is not graphite. It appears the negative electrode graphite material is produced from a material that includes graphite and a non-graphite material. However, this indicates a product-by-process limitation.

Claims 3 and 4 recite the limitation "the component". There is insufficient antecedent basis for this limitation in the claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3-5 are rejected under 35 U.S.C. 102(b)/103(a) as being anticipated by, and alternatively unpatentable over, Hayashi et al., JP 10-334915.

Hayashi teaches a rechargeable battery having an electrode comprising graphite particles. A dynamic energy process is applied to a graphite material so that the apparent density ratio between before and after the process becomes 1.1 or above. The apparent density ratio between

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before and after the process equals the tap density after the process/tap density before the process, and this is to become the index of sphericity. See abstract.

The intensity ratio R of a Raman spectrum is preferably 0.4 or less. In the Raman spectrum analysis, the intensity I_A of peak PA near 1580 cm^{-1} and the intensity I_B of peak PB near 1360 cm^{-1} were measured (0035). Therefore, $R=I_B/I_A=H_{sd}/H_{sg}$ and $H_{sg}/H_{sd}=1/R=G_s$. Since R is 0.4 or less, Hayashi teaches G_s is 2.5 or more.

The tap density ratio before and after processing is 1.7 or greater, more preferably 1.1 or greater. It is desirable to have a tap density after processing of 0.5-2 g/cc (see page 4, paragraph 0023-0024). The tap density of the graphite material is preferably in the range of 0.7-1.2 g/cc (see page 7, paragraph 0042). The true density of the graphite material is 2.25 g/cc or more (claim 2). Thus a packing characteristic index (tap density/true density) of Hayashi may be 0.53 ($1.2/2.25$ = tap density/true density).

The specific surface area of the graphite particles after processing (pulverizing) is below $25\text{ m}^2/\text{g}$ and more than $0.5\text{ m}^2/\text{g}$, preferably $2\text{-}10\text{ m}^2/\text{g}$ (0035). Table 4 shows different graphite material properties before and after a dynamic energy process/treatment. The SA in Table 4 represents surface area with the surface area of the graphite being $19.1\text{ m}^2/\text{g}$ before treatment and $8.9\text{ m}^2/\text{g}$ after treatment (Example 13). The surface area after treatment is 2.1 times that before treatment. The energy process is specifically pulverization. Hayashi teaches a surface area of the graphite being $4.5\text{ m}^2/\text{g}$, $4.8\text{ m}^2/\text{g}$, $8.7\text{ m}^2/\text{g}$ or $19.1\text{ m}^2/\text{g}$ before treatment (Table 4) and preferably $2\text{-}10\text{ m}^2/\text{g}$ after treatment (0035). Hayashi teaches an electrode having a graphite material with a (d002) distance between layers of 0.34nm or less (claim 2).

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Hayashi teaches natural graphite of high orientation/high crystallinity is used (0013-0014). High crystallinity natural graphite is known to have a rhombohedral structure (diamond structure). Hayashi teaches the natural graphite may be subjected to a surface grinding process (0029). Natural graphite has a rhombohedral structure (as stated in the present specification, see above).

Hayashi does not explicitly recite the graphite material has at least two peaks on a differential thermogravimetric curve. However, the graphite material of Hayashi inherently has at least two peaks on a differential thermogravimetric curve because the graphite material of Hayashi has a Raman spectrum having two distinct signal peaks. The two distinct signal peaks on the Raman spectrum indicate the graphite material contains two distinct carbon materials. A graphite material having two distinct carbon materials would inherently provide at least two peaks on a differential thermogravimetric curve.

Thus the claims are anticipated. The claims are alternatively unpatentable. Hayashi does not explicitly state the proportion of weight rejection due to the component other than graphite and as measured by DTG, is at least 5% and at most 40%. However, the limitation is a product-by-process limitation, which is not given patentable weight in the absence of unexpected results. It appears the component other than graphite is removed to produce the claimed negative electrode graphite material.

Response to Arguments

Applicant's arguments filed 12/13/06 have been fully considered but they are not persuasive. Applicant argues Hayashi fails to teach "the proportion of weight reduction as measured by DTG is at least 5% and at most 40%" as required by the claimed invention.

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However, the limitation is a product-by-process limitation, which is not given patentable weight in the absence of unexpected results. It appears the component other than graphite is removed to produce the claimed negative electrode graphite material.

Applicant asserts the claimed graphite material has a structure in which a component having a different structure from the inside of the particles sufficiently covers the surface of the particles to form the reformed portion. It is unclear how this argument relates to the claimed invention. Furthermore, the graphite material of Hayashi inherently has at least two peaks on a differential thermogravimetric curve because the graphite material of Hayashi has a Raman spectrum having two distinct signal peaks. The two distinct signal peaks on the Raman spectrum indicate the graphite material contains two distinct carbon materials. A graphite material having two distinct carbon materials would inherently provide at least two peaks on a differential thermogravimetric curve.

Applicant argues the irreversible capacity of a battery using the claimed graphite material for the negative electrode can be remarkably reduced. However, evidence of unexpected results must distinguish the claimed invention over the prior art of record. Furthermore, Hayashi teaches the irreversible capacity in an initial cycle is small (0070).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

February 6, 2007



TRACY DOVE
PRIMARY EXAMINER